

PREVALENCE AND RISK FACTORS OF HELMINTHIASIS IN PRESCHOOL CHILDREN IN OESAO, KUPANG, EAST NUSA TENGGARA

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ABSTRACT

Background: Prevalence of Soil Transmitted Helminth (STH) infection in Indonesia is generally still high ranging from 2.5% to 62%. This study aimed to determine the prevalence of STH and its risk factors among preschool children in Oesao, Kupang, East Nusa Tenggara (NTT).

Subject and method: This was a cross-sectional study conducted in Oesao, Kupang, NTT. A random sample of 23 preschool children aged 3 to 5 years with worm infections were selected from a primary school. The dependent variable was STH infection. The independent variables were personal hygiene and environmental sanitation factor. The data were collected by questionnaire.

Results: The prevalence of STH infections was 17.39%. Four (17%) children were Helminthiasis positive out of the 23 examined. One (6%) was positive for hookworms, 1 (6%) was positive for roundworms (*Strongyloides stercoralis*), and 2 (13%) were positive for hookworms (*Ascaris lumbricoides*). From personal hygiene factor, 4 children who were helminthiasis positive had poor personal hygiene such as not washing their hands after playing, playing with soils, walking barefoot, before eating. From environmental sanitation factor, 4 children who were helminthiasis positive had poor environmental hygiene. The absence of garbage disposal around their residential environment was a potential place for the growth of worm egg.

Conclusion: The prevalence of STH infection was 17.4% in Oesao, Kupang, NTT. Risk factors include poor personal hygiene and limited landfills.

Keywords: soil transmitted helminth, preschool children.

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BACKGROUND

Soil-transmitted helminth (STH) infections are among the most common neglected tropical diseases worldwide and affect the poorest and most deprived communities (Montresor et al., 2011). Over 1.5 billion people or 24% of the world's population are infected with soil-borne worms. The infection is widespread in the tropics and subtropics, with the greatest number

occurring in sub-Saharan Africa, America, China, and East Asia. More than 267 million preschool children and more than 568 million school-age children living in areas where the parasite is transmitted intensively requires treatment and preventive interventions (WHO, 2022). STH infection morbidity will affect nutritional status and impair cognitive processes. Several studies have shown that STH infection can result in delayed physical

growth and impaired cognitive development in school-age children (Brito et al., 2006; Crompton and Nesheim, 2002; Curtale et al., 1999; De Silva et al., 2003; Östan et al., 2007). STH infections are considered a leading cause of school absenteeism, sickness, and disability adjusted life years (DALYs) lost (Bethony et al., 2006; Montresor et al., 2011).

In developing countries, including Indonesia, Helminthiasis caused by intestinal nematodes the ringworm species is the highest at 60-90%. On the second is whipworms with the prevalence at 65-75% and followed by hookworms with the prevalence at 30-50% (Idris et al., 2019). The prevalence of Soil Transmitted Helminth (STH) infections in Indonesia is generally still high with varying data of 2.5% - 62%, mostly in populations with poor sanitation and the highest intensity obtained among preschoolers and primary school students. The study of Djuma, et al., 2020 in children from age 6- to 12-year-old at sub-villages II and IV in Manusak, East Kupang District, Kupang Regency found *Ascaris Lumbricoides* eggs in children, showing as many as 54 children (96.4%) of the 56 children in total to have been infected by *Ascaris Lumbricoides* worm eggs. The study shows that the risk factor for STH infection is caused by the the lack of handwashing habit (Djuma et al., 2020). Another research result conducted by Bulumanu (2018) at Baun 1 Public Elementary School, Teunbaun Village, West Amarasi Sub-district, covering 102 students in total as research subjects with 43 boys and 59 girls found that 12 children-6 boys and 6 girls (11.8%) were infected by *Ascaris*

lumbricoides type of the Soil Transmitted Helminth (STH) worm (Bulumanu, 2018).

People with high risk of worm infection are preschoolers and school-age children, women of childbearing age (including pregnant women in the second and third trimesters and breastfeeding women), and adults in certain high-risk occupations such as tea pickers or miners (WHO, 2022). The Oesao is one of villages located in East Kupang District, Kupang Regency. This area has cold weather and moist soil which make people, especially children, susceptible to Helminthiasis infection because the very moist and fertile soil in the area is serves as a medium for worm breeding. The lack of knowledge on both personal hygiene and environmental hygiene is one of the reasons as to why Helminthiasis infection increases.

SUBJECTS AND METHOD

1. Study Design

This was a descriptive study with cross-sectional design conducted in Oesao, Kupang, NTT.

2. Population and Sample

The target population of this study is preschool-age children (3-5 year-old). The sampling process was not done randomly (non probability sampling) with total sampling technique. Samples were selected from the population based on the inclusion criteria and exclusion criteria as follows. Inclusion criteria were children aged 3 to 5 years, Their parents willing to become subjects, aged 3 to 5 year-old, filled out validated questionnaires and collected feces. Exclusion criteria were children

whose parents did not approve inform consents.

3. Study Variable

This study provides an explanation of the incidence of Helminthiasis in 3 to 5 year-old preschool children in Oesao Village, based on personal hygiene and environmental sanitation factors.

4. Definition Operational of Variables

Personal hygiene variables such as nail clipping, after-playing hand-wash, eating using spoon, walking barefoot, playing with soil, six month worm medicine consumption, nail biting, before-eating handwash.

Environmental sanitation variables such as clean water availability, water closet ownership, tightly closed drinking water reservoir, environmental cleanliness of children's playground, garbage dumps around the residential area.

5. Data Analysis

The data that has been obtained is analyzed descriptively with prevalence and proportion formula.

6. Ethical Clearance

This study was declared to be ethically appropriate in accordance to 7 (seven) WHO 2011 Standards: (1) Social values; (2) Scientific values, (3) Equitable assessment and benefits, 4) Risks, (5) Persuasion/ exploitation, 6) Confidentiality and privacy, and 7) Informed consent, referring to the 2016 CIOMS Guidelines. Ethics approval was obtained from Kupang Health Polytechnic of Ministry of Health, Indonesia (LB.-02.03/1/0039/2022).

RESULTS

The table 1 shows that out of 23 3 to 5 year-old preschool children, 13

(56.53%) are boys and 10 (43.47%) are girls. Based on their age, 10 children (43.47%) are 3 year-old, 7 children (30.45%) are 4 year-old, and 6 are 5 year-old (26.08%).

As shown in Table 2 there are 4 (17.39%) children being Helminthiasis positive out of the chosen 23 children from age 3 to 5 years old who are chosen as samples and among the 4 positive children is 1 positive sample of hookworm, 1 positive sample of bracelet worm (*Strongyloides stercoralis*), and 2 positive samples of mine worm (*Ascaris Lumbricoides*).

Based on the distributed questionnaires about the personal hygiene factors of the 3 to 5 year-old preschool children, the obtained results on their daily habits are described in Table 3 The parents' responses to the questionnaires about the children's personal hygiene, the results shows that 4 (17.39%) children with poor personal hygiene are Helminthiasis positive while 10 (43.47%) children with poor personal hygiene are negative and 9 (39.14%) children with good personal hygiene are negative.

Based on the distributed questionnaires about environmental sanitation factors of the children, the results obtained on children's daily environmental hygiene are described in Table 4 The parents' responses to the questionnaire about environmental sanitation, the results obtained show that there are 4 children who have poor environmental hygiene or (17.39%) to be positive, while 19 (82.61%) children with good environmental hygiene being negative.

Table 1. Characteristics of research subjects

Characteristics	Frequency (n)	Percentage (%)
Sex		
Male	13	56.53
Female	10	43.47
Age (years)		
3	10	43.47
4	7	30.45
5	6	26.08

Table 2. Results of worm examination of worms in 3 to 5 year-old preschool children in Oesao

Worm Type	Examination Result				Total	
	Positive		Negative		N	%
	N	%	n	%		
<i>Strongyloides stercoralis</i>	1	4.54	22	95.46	23	100
<i>Hookworm</i>	1	4.54	22	95.46	23	100
<i>Ascaris Lumbricoides</i>	2	9.50	21	91.22	23	100
<i>Trichuris trichiura</i>	0	0	0	0	23	100
Total	4	17.39	19	82.61	23	100

Table 3. Results of Helminthiasis examination based on personal hygiene factors of 3 to 5 year-old preschool children living in Oesao Village

Personal Hygiene (Children's daily habits)		Helminth Infection				Total	
		Positive		Negative		N	%
		N	%	N	%		
Nail Clipping	Yes	4	17.39	19	82.61	23	100
	No	0	0	0	0	23	
After-playing Handwash	Yes	0	0	13	56.53	23	100
	No	4	17.39	6	26.08	23	
Eating using Spoon	Yes	4	17.39	19	82.61	23	100
	No	0	0	0	0	23	
Walking Barefoot	Yes	4	17.39	6	26.08	23	100
	No	0	0	13	56.53	23	
Playing with Soil	Yes	2	8.70	9	39.13	23	100
	No	2	8.70	10	43.47	23	
6 Month Worm Medicine Consumption	Yes	3	13.05	17	73.91	23	100
	No	1	4.34	2	8.70	23	
Nail Biting	Yes	0	0	2	8.70	23	100
	No	4	17.39	17	73.91	23	
Before-eating Handwash	Yes	0	0	19	82.61	23	100
	No	4	17.39	0	0	23	

Table 4. Results of Helminthiasis examination based on environmental sanitation factors of 3 to 5 year-old preschool children aged living in Oesao Village

Environmental Sanitation		Worm Infection				Total	
		Positive		Negative		N	%
		N	%	N	%		
Clean water availability	Yes	4	17.39	19	82.61	23	100
	No	0	0	0	0	23	
Water closet ownership	Yes	4	17.39	19	82.61	23	100
	No	0	0	0	0	23	
Tightly closed drinking water reservoir	Yes	4	17.39	19	82.61	23	100
	No	0	0	0	0	23	
Environmental cleanliness of children's Playground	Yes	4	17.39	19	82.61	23	100
	No	0	0	0	0	23	
Garbage dumps around the Residential Area	Yes	0	0	3	13.05	23	100
	No	4	17.39	16	69.56	23	

DISCUSSION

The results of this study found that prevalence of helminthiasis in 3 to 5 year-old preschool children was 17.39%. This is because preschool age children are also among the high risk population to get infected by worm disease at present. This result is in line with Djuma's community service research in 2018 on the prevalence of Soil-Transmitted Helminths (STH) worm infection in Naibonat Elementary School students in East Kupang District, Kupang Regency, resulting in 20.5% of positive student population being infected by STH (Djuma et al., 2020). The under-five-year-old children number in Indonesia is very large, making up to 10% of the total population. The toddlers' quality of growth and development in Indonesia needs serious attention because they are the future generation of the nation. Therefore, they need to get good nutrition, adequate stimulation and affordable quality health services, including early intervention for developmental disorders. In addition to these things,

various environmental factors that can interfere with the development of children also need to be eliminated (Novianty et al., 2018; Noviastruti, 2015).

From the results of this study it can be described that children with less personal hygiene have a higher risk of being infected with worms and it does not rule out the possibility that children with good personal hygiene will also be infected with worms. Personal hygiene and poor environmental sanitation in children are factors that facilitate the transmission of worms, especially groups of children who defecate at open water channels and at around their houses, eat without washing hands, and play barefoot around on soil contaminated by worm eggs (Martila et al., 2015). From the results of this study it can be known that children with less personal hygiene have a higher risk of being infected with worms and it does not rule out the possibility that children with good personal hygiene will also be infected with worms. Unfavorable environmental sanitation conditions allow the occurrence of various types of diseases

in children, including diarrhea, worms and gastrointestinal infections. Although they do not cause death, worms are still a problem in Indonesia, especially in toddlers and elementary school children. Worms cause a decrease in nutritional conditions, anemia, digestive tract disorders, deteriorating intelligence to a decrease in the quality of human resources (Novianty et al., 2018; Noviasuti, 2015). The expected healthy behavior is related to a person's living habits to maintain his/ her health, namely: maintaining personal and environmental hygiene (bathing and brushing teeth 2 times a day, always washing hands with water and soap before and after eating, before and after defecating, always wearing sandals to play), consuming balanced, healthy and nutritious food (consuming healthy and nutrition-balanced food sealed/ covered properly so as not to become infected by flies), and maintaining a clean environment (disposing of garbage in the appropriate places and always defecating and urinating at the appropriate places).

Based on the research results, it is concluded that the prevalence results of soil-transmitted helminth (STH) worm infection incidence show that there are 4 children (17.39%) being Helminthiasis positive out of the chosen 23 children from age 3 to 5 years old who are taken as samples and among the 4 positive children are 1 positive sample of hookworm, 1 positive sample of ringworm (*Strongyloides stercoralis*), and 2 positive samples of hookworm (*Ascaris Lumbricoides*). From personal hygiene factors of the 3 to 5 year-old preschool children living

in Oesao Village, it is found that children 4 children or (17.39%) with poor personal hygiene are Helminthiasis positive and their daily habits, such as not washing their hands after playing, playing with soils, walking barefoot, and not washing their hands before eating are factors that affect these children to be infected by Helminthiasis. From environmental sanitation factors of the 3 to 5 year-old preschool children living in Oesao Village, it is found that there are 4 children with poor environmental hygiene (17.39%) to be Helminthiasis positive because of the absence of garbage disposal around their residential environment around their residence where there is no garbage disposal which leads to environmental pollution which become a potential place for the growth of worm eggs.

AUTHOR CONTRIBUTION

Conceptualization: Yuanita Clara Luhi Rogaleli, Michael Bhadi Bia. Methodology: Yuanita Clara Luhi Rogaleli, Michael Bhadi Bia. Investigation: Michael Bhadi Bia, Siti Nurasiah. Data processing and analysis: Siti Nurasiah, Yuanita Clara Luhi Rogaleli. Writing until original draft: Siti Nurasiah. Writing until review and editing: Yuanita Clara Luhi Rogaleli.

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CONFLICT OF INTEREST

All authors declare that they have no conflicts of interest.

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